Omega Proteins Ltd.

Penrith

Report Title: Installation Information – Updating of Processing Lines

Permit Ref: EPR/HP3238AF

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Group Technical Advisor

Contents

1 Introduction

The site is currently permitted by the Environment Agency as an A1 Installation and a variation application is being submitted for changes to the rendering operation by updating the following processes:

- the production of single species meal (lamb and pork processed animal protein – PAP)
- upgrade of the poultry offal rendering process, with new equipment

Some Directly Associated Activities are also changing – these are discussed in the Annex to this document for completeness.

Planning permissions have been obtained for these changes where required. Technical information to support the application is submitted in the following documents:

- Updated Environmental Risk Assessment
- EMS summary
- BAT summary
- Site maps showing the location of the equipment
- Updated Odour Management Plan

2 Process Need

2.1 General

The site is currently permitted for mixed species rendering, poultry rendering and feather processing. There is a growing demand for single species raw materials for the pet food market following tightened rules on labelling of the finished product. Further opportunities have also been presented post-Brexit, with new customers in different countries. To enable the production of separate pork meal and lamb meal, these raw materials need to be selected out of the mixed species stream and processed separately to avoid any cross contamination. One of these processing lines will also be able to process pig hair or sheep fleece (separately from the meat and offal fractions) to enable more effective protein extraction from this type of raw material.

In addition to these lines, the development of the site also includes relocation of poultry processing to a new building, giving the benefit of improved building integrity, ease of maintenance and improved odour controls. New processing plant will be installed, incorporating improved processes for efficiency of production and a reduction in environmental impacts. This will leave one cooker available for processing to standard rendering in the existing area.

2.2 Current Operations

The production of processed animal protein (PAP) uses mixed species animal by products (ABP) including ruminant and non-ruminant. Due to the current limitations on the end use of ruminant derived material (as set out in ABP legislation) and the increase in different requirements from customers, the business is now looking at an expanded range of products.

The way the current system is set up requires a full clean down of equipment between different species so that no cross contamination can occur. A DNA test is required on single species product, therefore the clean down process is required to be thorough. This is obviously time consuming and costly in terms of materials and energy for the cleaning process. Frequent stop / start conditions are also inefficient in terms of energy consumption for the process. It is more efficient to split the raw materials into different categories prior to processing and this also removes the risk of cross contamination.

To enable a wider market to be considered, including for exports, this can require separate lines as a condition on the health certificates.

2.3 Delivery and Storage

When a delivery vehicle arrives at the site the raw material, and relevant documentation, is checked and the material weighed in.

Raw materials are delivered to a reception building which has a roller-shutter front door. This is kept closed when not in use to limit possible fugitive odour escape. Personnel access is via self-closing personnel doors, to ensure that the main door remains closed at all times except for vehicle ingress and egress. In the tipping area, the raw materials are unloaded into stainless steel hoppers.

Each hopper is fitted with a hydraulically actuated close-fitting lid to limit possible fugitive odour releases.

An interlock system prevents the outer door opening until a time equivalent to one extraction air change has elapsed after the hopper door has been closed. This ensures extraction of odours from the area prior to the outer door opening.

Trailers and containers are thoroughly washed after each delivery, in line with ABP regulations – the trailers will be re-sheeted and driven to the trailer wash building.

The poultry raw materials will be tipped in the existing poultry tipping area and transferred by pumping across to the new building via a dedicated pipework system into holding tanks in the processing area. The pipework system will share the gantry used for delivery of steam and other services. For cleaning purposes, the tanks will have access points and the ducting will be cleaned after use (with steam) to prevent a build-up of material.

2.4 Processing

2.4.1 Single Species

The processing methods are the same as that currently used on site.

Raw material is fed to a crusher to reduce the particle size, before being fed via a closed pump feed to a cooker (steam heated disc drier) located in the processing building. The operating temperature is set to comply with the current regulations for processing ABP.

The process lines will be validated by the Competent Authority (APHA) under Method 7 (as per the existing lines) to set the throughput and minimum processing temperatures. This will be batch or continuous, depending on the species and end use of the finished product.

During the process the water fraction is evaporated off and extracted to the primary odour abatement (thermal oxidiser). The mixed oil and meal are removed from the cooker via a variable feed screw to the pressing operation. The oil is drained from the meal (greaves) in a screw conveyor with a perforated plate and then further extracted using presses. The oil is cleaned up using centrifuges (tricanters) and pumped to externally located and bunded storage tanks via the day tank. The day tank will be situated inside the building.

From the presses the meal is conveyed to a holding bin. From the bin the meal passes to a grinder, which grinds the meal to a fine powder. The ground meal passes over vibrating screens to generate a product with a specific size distribution. Oversized particles are conveyed back to the raw materials processing area for re-work.

From the final hopper meal is discharged by gravity into tote bags and placed in covered storage to await final analysis and despatch.

All transfer conveyors are covered.

Bins of re-work material are covered being before transferred manually to the tipping shed.

2.4.2 Poultry Line

There is a high demand for good quality finished product, particularly with non-ruminant material as the end uses are more varied and include animal and pet food.

The new equipment to be installed is a replication of that detailed in the Variation Application EPR/HP3238AF/V002. The low temperature oil extraction comprises of a pre-heat vessel (render vessel), set up to separate the oil from the raw material at a lower temperature than the standard rendering process. The preheat vessel contains a vertical stage water jacket and raw material will move through it. The use of steam will increase the water jacket temperature to 60-90 ^{0}C and the vessel is designed for gentle heating of the raw material without causing damage to the oil.

The material leaving the render vessel will be put through a tri-canter to release the oils, with the residual greaves material dried in the disc cooker. The discharged material is then separated to leave further oil and poultry meal.

The cleaned oil is pumped to externally located storage in bunded tanks.

The meal is conveyed to a holding bin. From the bin the meal passes to a grinder, which grinds the meal to a fine powder. The ground meal passes over vibrating screens to generate a product with a known size distribution.

From the final hopper meal is discharged by gravity into tote bags and placed in covered storage to await final analysis and despatch.

All transfer conveyors are covered.

Any bins of re-work material are covered being before transferred manually to the tipping shed for re-processing.

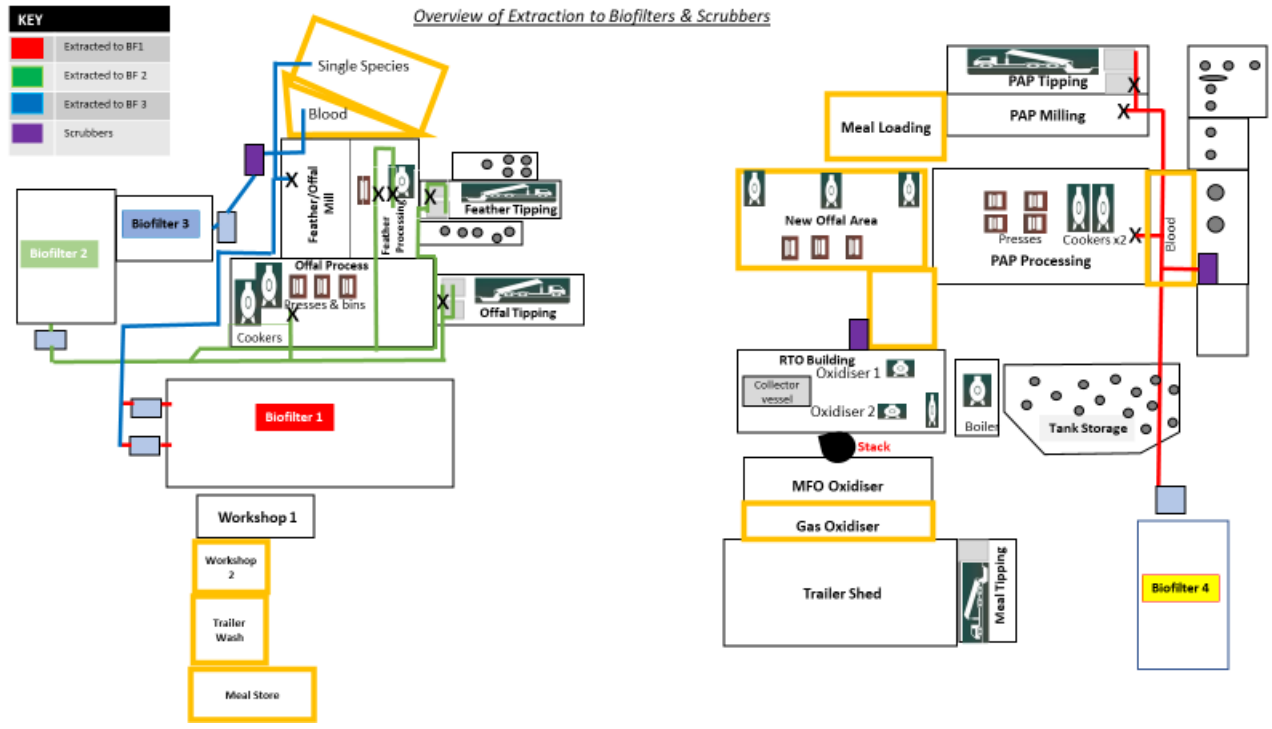
The thermal energy consumption of the preheater will be far less than of the disc cooker. Water condensate will be recirculated for heat recovery or re-use for washing tasks (or if not required it is returned to the hot well for use in the combustion plant).

The liquid fraction from the processing will be recirculated through a Waste Heat Evaporator on each line. This will enable some of the process heat to be recuperated and also handle the evaporated liquid fraction instead of the vapour being directed to thermal oxidation.

2.4.3 Location

A schematic of the location of the new processes on the site is shown below. The offal processing will occupy a new building that has replaced the engineering workshop and the single species line is in a new building adjacent to feather processing.

Fig 5. Schematic Site Layout



2.4.4 Directly Associated Activities

In order to support these changes, the following are also to be considered:

- Re-location of finished product storage and loading facility, with new storage area
- Re-location of air-cooled condenser units

Further details in Appendix I.

3 Potential Emissions and Control

3.1 Introduction

This section addresses the potential emissions and amenity impacts associated with the reception and processing stages and sets out the mitigation measures proposed and residual impacts.

3.2 Odour

Indicative standards for BAT in odour control are available in the BREF (Integrated Pollution Prevention and Control Reference Document on Best Available Techniques in the Slaughterhouses and Animal By-products Industries May 2005) and SG8 (Guidance for the A2 Rendering Sector 2008). Aside from the detailed standards these general principles for odour control are considered:

1. Process material that is as fresh as possible, in order to minimise the potential for odour creation.
2. Treat odours of different character and intensity in different equipment.
3. Use containment and point extraction as much as possible rather than relying on general area extraction.

In addition to those, the company has implemented further controls in the new buildings to reduce odour at source by cooling the immediate environment and improving the cleaning:

4. Use of water sprays within the main room air extraction ducting to cool temperature and therefore reduce odour
5. Use of a CIP system within the ducting for improved cleaning (linked to the cooling system)
6. Improved insulation of hot pipework to save energy and to reduce temperature (linked to a reduction in odour)

Effective odour control relies on the additive effects of a range of techniques each of which contributes to the overall process of minimising odour impacts. Thus, the various elements described below should be seen as part of an integrated whole rather than viewed in isolation.

Material Freshness. Over the recent past the site has made significant improvements in the supply chain to ensure that material is received as fresh as possible. Operators also use experience and judgement to ensure materials are processed efficiently and that rework and its associated odours is minimised as is the time that materials are held on site prior to processing.

Odour Differentiation. The process treats odours of different character and intensity in different equipment – high intensity odours are treated in the oxidiser and via the use of the Waste Heat Evaporators, and lower intensity odours in the biofilter system and/or with chemical scrubbers.

Containment. The general design principle of the proposed development is for conveyors and equipment to be enclosed as far as practicable and to extract from these enclosures rather than to fit high throughput general extraction to the building.

This document discusses the three odour streams that require abatement:

1. Process Fume. This is the direct emission from the process (cooker) and consists mainly of water vapour but can have a significant odour content.

2. High Odour Extract (Foul air). This is highly odorous air extracted directly from areas where the odour potential is highest. Typically, this will be areas such as the meal presses where hot processed material can be in contact with the surrounding air.

3. General Extract (Room air). In addition to the high odour point extractions there will be general air extraction from the buildings. This extracted air will ensure that buildings have a general net inflow of air (i.e., they will be under negative pressure) and will be characterised by being high volume but low odour.

3.2.1 Process fume

This is a high intensity odour stream. Indicative BAT is for such streams to be abated by thermal oxidation and this strategy has been adopted at the Omega installation. As detailed in the previous permit variation (EPR/HP3238AF/V002) – this abatement is provided by a Multi-Fuel (MF) Thermal Oxidiser and a recuperative thermal oxidiser using natural gas as a fuel. The total abatement capacity is calculated as 43.8 (21 by the MF Oxidiser and 22.8 by the gas oxidiser) tonnes of process fume per hour.

The combustion temperature is automatically controlled and continuously monitored, the normal operating temperature is 900^0C or above with a minimum temperature cut out of 850^0C.

Each oxidiser has its own collector vessel, and these are linked to allow re-direction of process fume between units.

Further abatement can be provided by the air-cooled condensers (Condenser A 5m^3 and Condenser B 10m^3). The air-cooled condensers are fitted in parallel to the process fume extraction duct and isolated from the duct by actuated dampers.

The inlet and outlet condenser temperatures are continuously monitored and recorded. The operation is controlled via the SCADA system.

The installation of Waste Heat Evaporators (WHE) in the poultry processing area will deal with process fume that would otherwise have gone to the oxidiser. This is the same design as the WHE on the existing feather line.

The processing lines are operated to ensure that the rate of feed of material for rendering is relative to the capacity of the available duty odour abatement systems. This is controlled automatically.

3.2.2 Foul Air

The MF oxidiser will deal with process fume and foul air in the same way as the recuperative oxidisers. The support odour abatement will then revert to the gas thermal oxidiser. The MF oxidiser also has a larger requirement for combustion air which means that more foul air can be processed if required and room air can be diverted to the oxidiser instead of going to the bio- filters.

Local collection vessels will be installed in the new processing areas, these are fitted with manual dampers (lockable to ensure the fume is under management control). These are in addition to the main collector vessels at the oxidiser building.

There is capacity for the MF Oxidiser to deal with 46,000 m^3/hour and for the gas oxidiser to deal with 6.2 m^3/hr of air for combustion, in addition to the process fume. This can be a mix of foul air and room air.

3.2.3 Abatement Capacity

The MF oxidiser and the new gas oxidiser both have a larger capacity for process fume than the original two thermal oxidisers on the site. Either unit has the capacity to deal with the detailed changes.

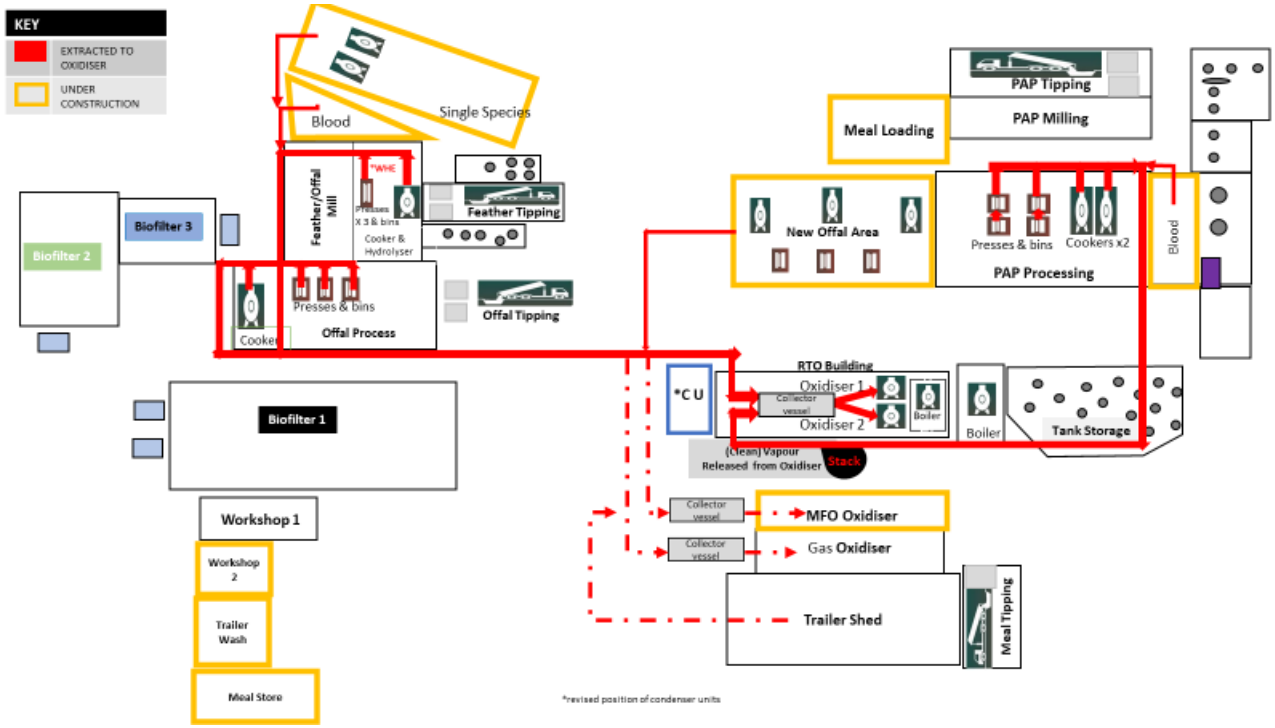
The lamb and pork processing will be a percentage of the PAP Mixed species throughput. Therefore the processing of these materials will not add any further process fume to the total site loading.

The poultry line throughput will have a focus on removal of fat at a lower temperature prior to the standard rendering process. Increasing the number of render vessels ensures that the production of the low temperature oil can meet current and future demand. The use of tri-canters removes most of the moisture as water and the introduction of Waste Heat Evaporators to the process will deal with the fume from the low temperature equipment and condense it, hence reducing the total amount of process fume directed to the oxidiser from the poultry process. Under this set up, only the non-condensable gases (approximately 1-2% of the process fume under the standard method of processing) will pass to the oxidiser.

The standard rendering equipment (cooker and presses) will remain in the existing poultry building for additional support should material (for example, 'drier' material such as whole birds) received be unsuitable for processing at a low temperature.

Further information on abatement capacity is given in the Odour Management Plan (OMP).

Figure 6 – Schematic of Foul Air and Process Fume Extraction



3.2.4 Room Air

Indicative BAT is to have area extraction and to direct the extracted flow to a biofilter. With the installation of new equipment, the point extraction from areas such as presses and buffer bins (high odour extract – foul air) will be improved so that only the 'low odour' room air (general extract) is

extracted to the biofilters. Improvements to cleaning of ducting and insulation of hot pipes also serves to lower the odour concentration in the room areas.

Four bio filters will serve the processes and will be divided up as follows:
BF1 – this currently takes extracted air from the mixed species (PAP) tipping shed, process area (including blood processing), mill and blood tank. The trailer shed air will be sent to the oxidiser (MFO) as combustion air when that is in use. The single species area will be directed to BF1 when completed and the PAP air to BF4.

BF2 – extracted air from the poultry and feather tipping sheds, process buildings and blood tanks. This will not change, except that offal processing will be mainly carried out in the new building.

BF3 – extracted air from the poultry mill (feather and offal meal), avian blood drying plant (air that is not utilised by the dryer).
This will not change.

BF4 – will provide abatement for the PAP area, thus reducing the load currently designated for BF1. Then the single species area will be directed to BF1. The room air from the new offal processing area will be treated by means of a chemical scrubber and some will be extracted for combustion air (for the multifuel oxidiser (MFO)) as noted in the earlier section.

There will effectively be one biofilter for each of the main processing areas (offal & feather, PAP, single species, milling). **For further details on the specification for BF4 see Annex II.**

The bio filters have been designed to allow for excess capacity and the ducting is interlinked thereby allowing the use of dampers to direct the air to an alternative bio filter should maintenance be required in a specific area.

The extraction to the biofilters will be supplemented by additional extraction from the process buildings via a dedicated collector vessel, which will pass to the oxidiser as combustion air, as explained in the earlier section.

In addition to calculating how much air the biofilters can process, consideration is given to the odour loading from the different areas and the odour removal efficiencies of each unit. Performance of the biofilters is routinely monitored to ensure that effective odour removal rates are maintained. Parameters continuously monitored and recorded are pressure, temperature in and out of the humidifiers and humidity of air flow into the biofilters. Other inspections include assessment of weed growth, measurement of flow rates, testing for odour, measurement of microbial activity, pH and moisture content of the media.

Room air from the new offal processing area will be treated in a wet venturi scrubber consisting of a polypropylene tower and treatment with caustic and sodium hypochlorite. This allows for further flexibility of abatement methods. **Further detail is in Annex III.**

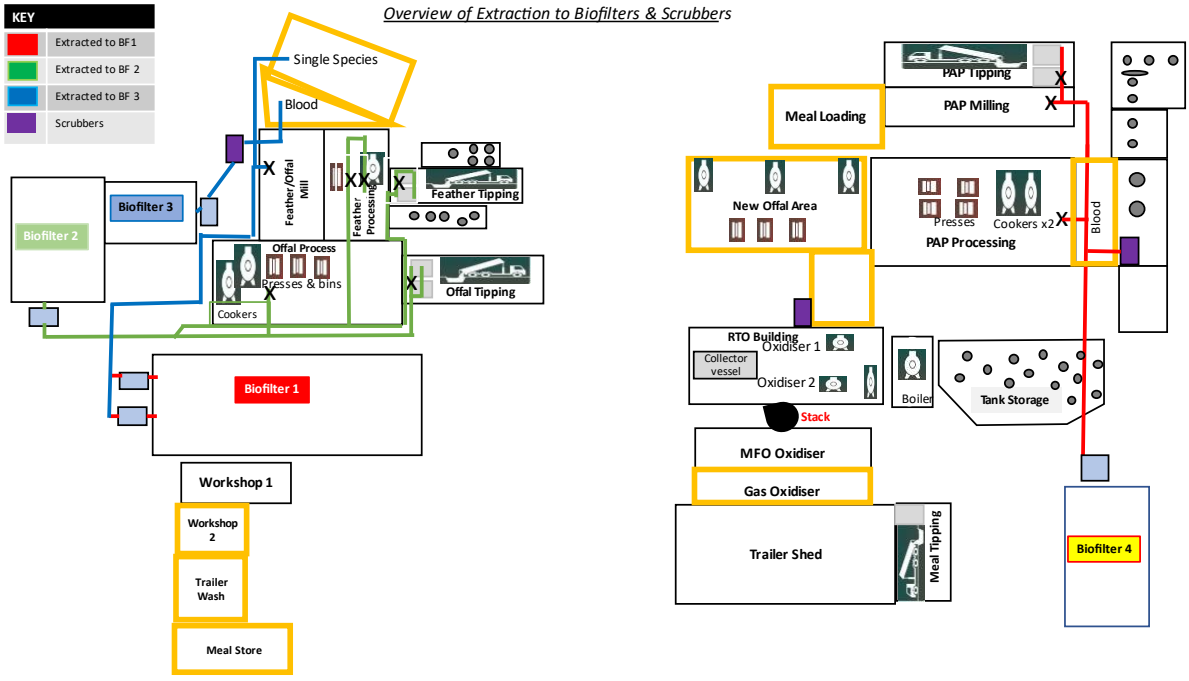
The odour is removed by absorption into the liquid phase (Stage 1) and then chemical neutralisation (Stage 2). The Redox and pH are automatically monitored and controlled. The exact composition of the scrubbing liquor and dosing control methods will be confirmed during commissioning. A water spray curtain will cool the air stream remove particulates.

The treated air leaves the system via the stack, which in this case will be re-purposing of the stack for the Bradford oxidiser (Grid Reference NY4997429609). Information available for these types of

units being used in this industry indicates that the odour removal efficiency is similar or better than a biofilter.

The input odour concentration loadings vary according to the plant area being served, but this area is expected to be at the lower end due to the heat insulation, cleaning process for the ducting and housekeeping measures. **A review of the potential performance of the scrubber is detailed in the Environmental Risk Assessment document.**

Figure 7 – Schematic of Room Air Extraction



3.3 Noise

The processing equipment, fans and conveyors associated with the new processes are potential noise sources, therefore to reduce impact these are covered and internally located. All processing equipment will be contained within a building to minimise the impact on external sensitive receptors. **See the environmental risk assessment document for more details.**

As part of the Improvement Conditions in the current permit, a site noise assessment is being carried out. This will inform any potential requirement for abatement or future monitoring.

3.4 Vibration

The system does not use equipment that will have sufficient power to generate vibrations that could be felt beyond the installation boundary.

3.5 Dust

Dust is not expected to be an issue.

The handling of processed materials that might give rise to fugitive dust emissions is carried out inside buildings to ensure that the possibility of such fugitive releases is minimised. Dusty materials are transferred between buildings in closed tote bags.

An additional store is being built for finished products to reduce the impact of handling material outside.

3.6 Waste

There are no additional 'waste streams' from the processing operations . Wastewater from cleaning operations is dealt with below. The types of raw material processed remains the same as currently permitted and any waste from the process can be re-worked or be downgraded for rendering at an alternative facility.

The chemicals used in the scrubber are re-circulated within the unit. Blowdown can be tailored within the unit to give 0.1 or less fluctuation in pH, therefore it is estimated that 1% or less of the chemical would need to be disposed of. When 'spent' these can be disposed of to the effluent treatment plant (as advised by the equipment supplier) subject to the usual controls on chemical dosing for effective treatment, although a drip feed of less concentrated material may be a preferable option.

There are also options to dispose to a licenced contractor, should this be required. The on-site laboratory currently has arrangements in place with contractors for the removal of waste laboratory chemicals.

3.7 Emissions to Air

3.7.1 Point Source Emissions components to be measured

The point sources are related to odour abatement and the existing combustion plant emissions (see Environmental Risk Assessment). A dispersion model has been carried out and the details are summarised in the Environmental Risk Assessment document.

A chemical scrubber is being installed as part of this variation as previously discussed (section 3.2.4 and Annex III).

3.8 Fugitive Releases to Air

The operations will take place within a building and the integrity will be checked as per the existing EMS procedures for building integrity (EID07). New buildings have improved integrity, benefitting from a double skinned construction.

3.9 Point Source Releases to Water

3.9.1 Surface Water Discharges

There is no direct discharge to surface water associated with this new plant. Any roof water will be dealt with as per the existing arrangements for the main installation. Contaminated and potentially contaminated surface water will be directed to the existing effluent system for treatment.

3.9.2 Foul Water Discharges

The additional plant does not need its own mess and toilet facilities so there are no specific foul water discharges associated with these changes.

3.9.3 Trade Effluent Discharges

Wash waters and condensate will be directed into the existing effluent system. The plant upgrades discussed here were considered in the original design of the effluent plant, therefore the capacity for additional volume has been built in. This will be effected by bringing the second aeration lane into use (which doubles the current capacity) and expanding the MBR section by adding more cassettes to the modular set up. Condensate is directed to the anoxic zone so is not affected by the flow rate limitations of the DAF unit. Clean water (permeate) can be used on site so final flow will not impact on the trade effluent discharge conditions **(for further information see environmental risk assessment).**

The nature and composition of the wastewater is the same as currently produced so will not have an impact on the ability to treat to the Trade Effluent Consent requirements or to the clean water specification for re-use.

3.10 Fugitive Releases to Land and Water

The installation has in place an infrastructure monitoring programme designed to ensure there is no loss of integrity to the systems designed to prevent fugitive emissions to land and to controlled waters. The infrastructure monitoring programme forms part of the EMS and incorporates the elements listed below:

- Tank, bund and pipe work inspections;
- Impermeable surfaces;
- Drainage system.

Where deficiencies are encountered these will be reported as part of the EMS using the incident and corrective action structure and repairs instigated.

Chemicals will be stored in self bunded containers and inspections for integrity added to the existing site procedures.

Where individual IBCs of chemicals are used during processing operations, these will be used and stored inside the processing building.

3.11 Raw Materials

There are no changes to the existing raw materials used in processing activities on the site. These are anti-foam and antioxidant used in the cooking process, cleaning chemicals, effluent processing chemicals and chemicals for the scrubbing systems. These materials are stored in designated areas and use is monitored and recorded. Storage and disposal is in accordance with the Material Safety Data Sheets for each product and they are proprietary brands sourced from reputable suppliers.

With regard to the raw materials for processing (ABP) the range of materials to be processed remains the same. As noted in section 3.2.3, the lamb and pork processing will be a percentage of the current PAP Mixed Species throughput. From a review of the throughput information – pork makes up approximately 5-10% of the Mixed Species intake and lamb makes up 15-20%. The pork weights also include pig hair should this be processed as separate batches.

The capacity of each line is set by APHA on validation (see Supporting Information Document Table 1a) although it should be noted that some are batch processes and therefore not all lines will run at the same time.

Annex I – Directly Associated Activities

Changes to finished product storage and loading facility

The storage and handling of solid finished product (meals) has been reviewed to ensure that areas are under cover for loading and sufficient storage capacity is available.

An additional storage facility is being constructed to act as a covered area for the storage and loading of finished product (meals). This operation currently takes place at the milling area.

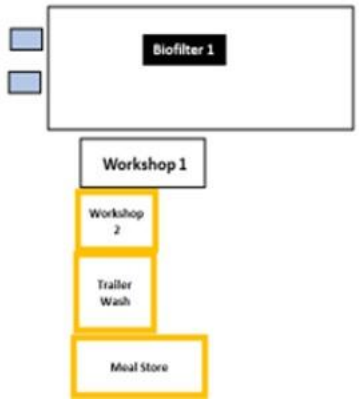
It has been relocated to avoid congestion, reduce the amount of time product spends outside of a building, reduce the potential for fugitive emissions and to provide weather protection for the material.

This is a standard metal clad, steel portal construction with a roller shutter door and concrete floor. The building is 875 square meters with space for finished product and for internal loading of vehicles for despatch. It is clad in Juniper Green to match the other buildings. A concrete hardstanding area is external to the shed for HGV access.

As with other buildings on site, the construction allows for a high standard of integrity to comply with animal health and environmental requirements and ease of cleaning to maintain hygiene standards.

Located on the West side of the side, at the rear of Biofilter 1 and adjacent to the trailer wash area, in a new building.

Figure 8 - Schematic of Site Layout



Relocation of Air-Cooled Condensers

The use of the air-cooled condensers is already documented. The location will be changed so that the units are all in the same area, which allows for improved monitoring and control.

The location is marked as *CU on the location plan in Fig. 6. One unit is currently situated at this point and the second one will be moved there from a nearby location.

Annex II – Specification for Bio Filter 4

The design is the same as those already in use on the site. A concrete structure with a chamber at the base to collect run off water, slatted concrete, covered with mesh, to hold the wood chip and approximately 1.5m of wood chip media. Additional sheeting around the edges prevents the by-passing of air.

Railings will be fitted around the top for safety of personnel and sprinkler systems fitted for irrigation.

Fig 1 Side View (planned BF)

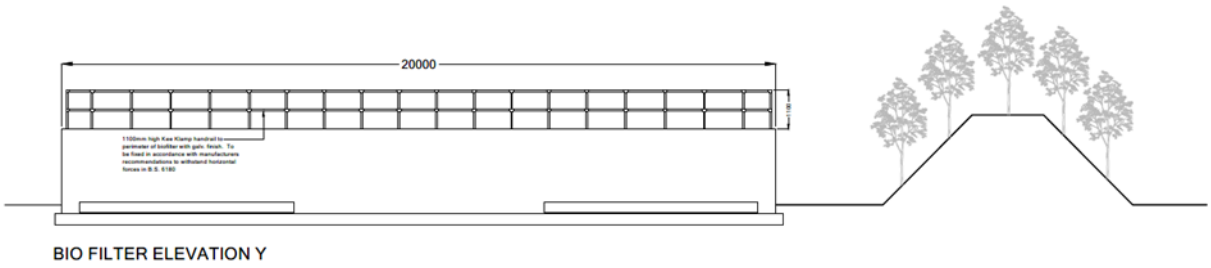
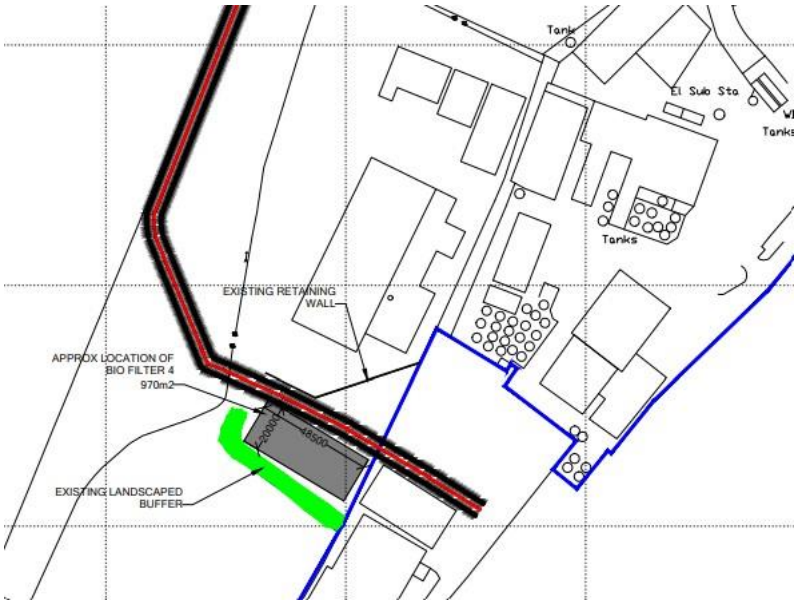


Fig 2 Design of Main Structure (existing BF)

The new unit will be located on the edge of the site, adjacent to the thermal oxidisers. The exact siting is restricted by underground mains cables (shown as red / black) on the diagram.

A schematic of the location is shown below.



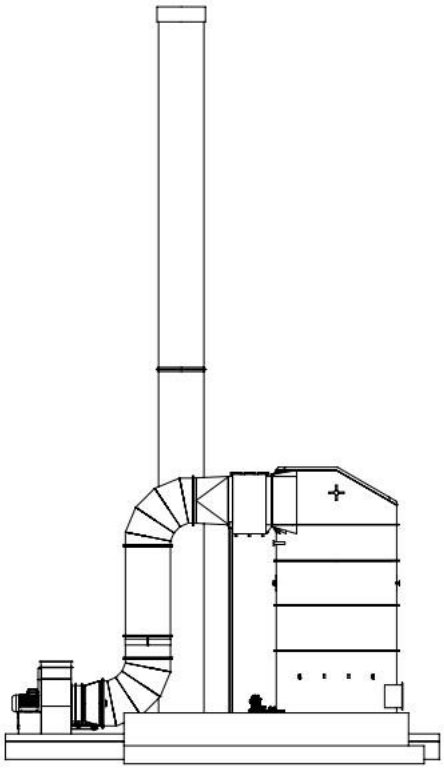
The dimensions of the unit are as follows: 20 x 48.5 x 1.5 m

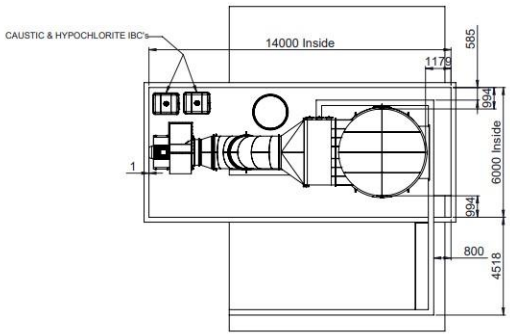
The Media is woodchip to a depth of approximately 1.5m. Performance will be monitored as per the existing procedures and a replacement programme of 3-5 years put in place.

The size of this unit allows the treatment of approximately 110,000 m3 of air (based on a low residence time and high inlet air flow) and can therefore add 30- 40% to the abatement capacity of the site biofilters. This will be confirmed on final construction.

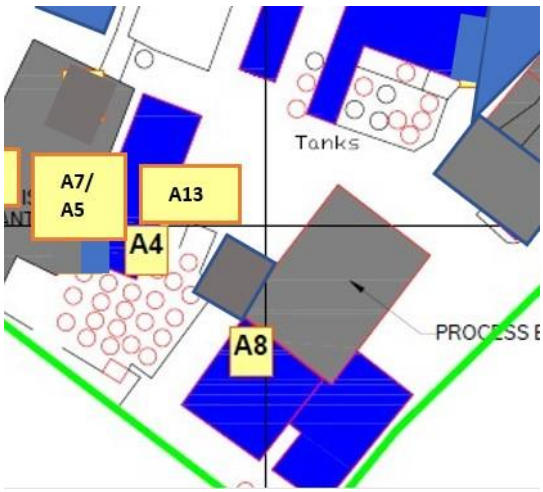
Annex III – Specification for Chemical Scrubber

The design is principally the same as those already in use on the site for blood processing, this unit utilises a two-stage chemical process and makes use of an existing stack as the emission point.





The new unit will be located external to the newest process building (offal processing) and use the emission point A6 (now re-numbered as A13).



The chemicals used in the scrubber are re-circulated within the unit. Blowdown can be tailored within the unit to give 0.1 or less fluctuation in pH, therefore it is estimated that 1% or less of the chemical would need to be disposed of. When 'spent' these can be disposed of to the effluent treatment plant (as advised by the equipment supplier) subject to the usual controls on chemical

dosing for effective treatment, although a drip feed of less concentrated material may be a preferable option.

There are also options to dispose to a licenced contractor, should this be required. The on-site laboratory currently has arrangements in place with contractors for the removal of waste laboratory chemicals.

The unit is self-bunded and the chemicals are in self bunded containers situated adjacent to the processing building. The chemicals are automatically dosed into the scrubber.

The scrubber is designed to process 68,000 m3/hr of air, this is slightly more than the volume of air required to be removed from the process area (61,400 m3/hr).

The packing material is a bed comprising of 50mm polypropylene pall-rings.

A water spray curtain captures contaminants in the air stream.

De-mister blades prevent carry over into dry sections of the unit.

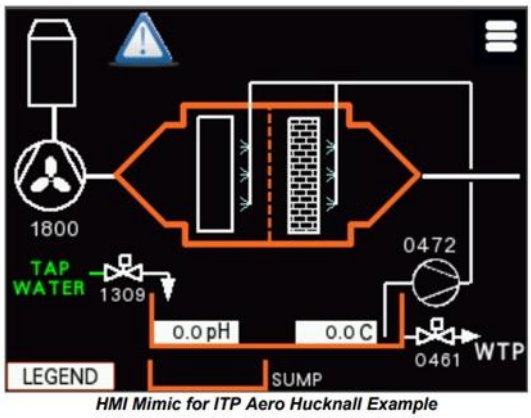
The unit has Redox automatic dosing and pH automatic dosing.

A high level probe is fitted to prevent overfilling of the unit.

To aid dispersion, the (soon to be) redundant stack for Oxidiser 2 will be used, which is 24.5m high.

Temperature control in the form of a heater is installed to prevent the water in the unit freezing in winter.

A representation of the SCADA screen is shown below, personnel will be able to operate pumps and view any errors.



HMI Mimic for ITP Aero Hucknall Example